

Nanosculpting using alumina templates

Oklahoma/Arkansas MRSEC, DMR-0080054

Integrated circuits and magnetic storage in the future will be made up of nanometer-sized elements in neatly arranged patterns. The key is how to fabricate them.

An innovative and flexible route to building the required variety of nanostructures in regularly ordered patterns starts with aluminum foil! The aluminum foil is processed under oxygen to create a template of regularly spaced and sized holes. This template is used like an art stencil on top of a base material while growing different types of metal or semiconductor structures (dots, rings, or pillars). With more steps, the stencil can also be used to protect areas of the base to etch out holes in the unprotected areas. The result: highly ordered, dots, holes, rings or pillars over wide regions.

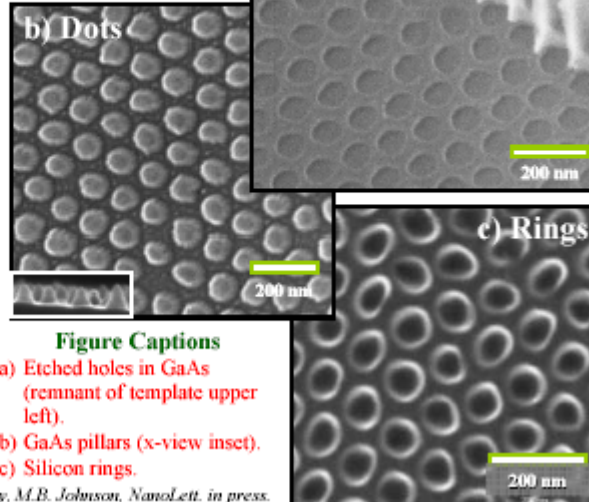


Figure Captions

- a) Etched holes in GaAs (remnant of template upper left).
- b) GaAs pillars (x-view inset).
- c) Silicon rings.

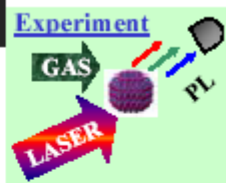
K.L. Hobbs, P.R. Larson, G.D. Lian, J.C. Keay, M.B. Johnson, NanoLett. in press.

CdSe Nanocrystals as Nanosensors for Gases

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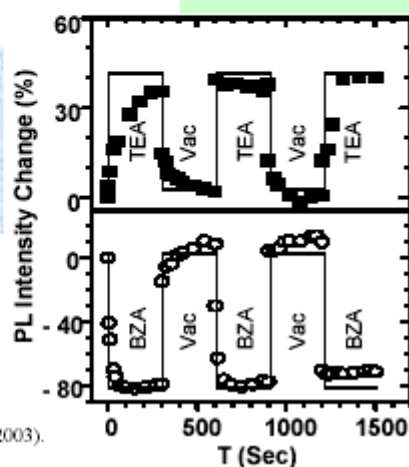
Gas Sensor Market is a growing multibillion \$ business. New technologies are needed to meet the increasing demands. Nanocrystals (NCs) represent the new generation of engineered platforms for analyte detection due to the large surface/volume ratio and tunable physical and chemical properties.



In case of NCs, it is anticipated that the adsorption of analyte molecules on the surface of the NCs alters the surface quenching states and hence changes the radiative probabilities (emission). The challenge is to engineer the optimal platforms for different targets!

Figure Caption The dynamic response of the PL intensity with altered atmosphere between vacuum and amine gases.

Top: TEA = Triethylamine. **Bottom:** BZA = Benzylamine.



Nazzal, A. Y.; Qu, L.; Peng, X.; Xiao, M., *Nano Letters*, **3**, 819 (2003).

Education & Outreach

Oklahoma/Arkansas MRSEC, DMR-0080054

Focusing on the K-12 Community in Oklahoma



SeeS: Sooner Elementary Science and Engineering

- Informal after-school learning experience for pre-K—5 students
- Parental and engineering & science undergraduate volunteers provide:
 - Hands-on inquiry based experiments
 - Concept development for 3-5 terms related to the theme of the day
 - Motivation to learn more about science and consider science & engineering careers
- C-SPIN sponsors one elementary school and the OU education coordinator serves on the organizational & curriculum development team.

Other Activities:

- Research Experiences for Teachers
 - 5 teachers over 3 summers (1 twice)
- Classroom visits
- Class tours of C-SPIN laboratories and shared facilities
- Research Experiences for Undergraduates

